



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

Quality Assurance Procedure

The TBI Firearm and Toolmark Identification Unit's (FTIU's) Quality Assurance Procedure supplements the TBI Forensic Services Division Quality Assurance Manual (QAM). These procedures, in combination with the QAM, FTIU Standard Operating Procedures, FTIU Training Manual, FTIU Calibration and Maintenance Manuals, and FTIU Chemical and Reagent Manuals, provide the basis for the effective quality management of analyses performed in the FTIUs in the Nashville and Memphis Regional Laboratories.

1.0 Goals and Objectives

1.1 The goal of the FTIU of the Tennessee Bureau of Investigation Forensic Services Division is to provide law enforcement and judicial officers with the results from testing firearm and toolmark evidence associated with criminal investigations. This includes, but is not limited to, the examinations of firearms, ammunition components, tools and the markings they produce, serial number restorations, trajectory analysis and firearms evidence recovery from vehicles, and clothing items for muzzle-to-target distance determination. The Forensic Scientists working within the FTIU will provide reliable, quality examinations in a timely manner, accurately report the conclusions of these examinations, and testify to those results. The quality, integrity, and accuracy of these results are ensured through the implementation of a detailed Quality Assurance program.

1.2 Objectives

1.2.1 The objective of the FTIU Standard Operating Procedures is to provide the basic outline of procedures routinely used to analyze evidence submitted in Firearm and Toolmark cases.

1.2.2 The objectives of the FTIU Quality Assurance Procedure are to:

- Ensure uniformity and accountability in records and analytical techniques.
- Ensure the accuracy of analyses and reporting through technical and administrative reviews of case records.
- Ensure the use of documented and valid procedures and equipment.
- Ensure that the personnel performing analyses within the FTIU have the appropriate level of training and education.
- Ensure the Forensic Scientists' competencies in performing the analyses and in interpreting results through annual proficiency testing.

2.0 Personnel

2.1 Job Descriptions

2.1.1 FTIU Supervisor



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

- Maintains supplies, equipment, and other materials necessary for the operation of the FTIU.
- Trains, supervises, and evaluates forensic scientists and technicians assigned to the FTIU, and their work.
- Enforces policies and procedures for operations and functions within the FTIU.
- Supervises operations of the FTIU such as scheduling assignments and case reviews.
- Supervises the examination of physical evidence when necessary.
- Performs verifications and Technical Reviews of casework.
- Performs Administrative Reviews of case files.
- Analyzes and examines physical evidence when necessary.
- Enters data and images into the National Integrated Ballistic Information Network (NIBIN), and analyzes correlated images for associations.
- Composes technical laboratory reports describing the evidence examined, the results of examinations, and interpretation of results.
- Testifies in court as an expert witness on laboratory findings.
- Technically monitors court testimonies of other forensic scientists and technicians assigned to the FTIU.
- Coordinates Peer Review processes.
- Serves as the Technical Leader.

2.1.2 Technical Leader

- Evaluates all methods used in the FTIU and proposes new or modified technical procedures to be used by forensic scientists/technicians.
- Solves technical problems of analytical methods and oversees training, quality assurance, safety, and proficiency testing.
- Provides literature for review to members of the FTIU.
- Remains accessible to the laboratory to provide onsite, telephone, or electronic consultation as needed.
- Technically monitors court testimonies of other forensic scientists and technicians assigned to the FTIU.

2.1.3 Forensic Scientist 2 (Firearm Examiner)

- Analyzes and examines physical evidence.
- Performs microscopic examinations for the identification and analysis of fired bullets, cartridge cases, other ammunition components, and other toolmarks.
- Performs trajectory analysis and firearms evidence recovery from vehicles.
- Performs chemical tests for the identification and analysis of gunpowder and lead residues, and shotgun pellet/pattern examinations on clothing or other items.
- Performs serial number restorations.
- Enters data and images into the National Integrated Ballistic Information Network (NIBIN), and analyzes correlated images for associations.



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

- Composes technical laboratory reports describing the evidence examined, the results of examinations, and interpretation of results.
- Testifies in court as an expert witness and provides expert opinion testimony.
- Technically monitors court testimonies of other forensic scientists and technicians assigned to the FTIU.
- Verifies evidence for other forensic scientists.
- Conducts technical and administrative reviews on case records.
- May gather physical evidence at crime scenes as a member of a Violent Crime Response Team (VCRT).
- May technically monitor crime scene court testimonies of other forensic scientists assigned to a VCRT.
- Maintains technical and professional competence.
- Conducts troubleshooting and method development.
- Ensures compliance with safety rules and regulations.
- Conducts laboratory housekeeping.

2.1.4 Forensic Scientist 1 (Firearm Examiner in Training)

- Analyzes and examines physical evidence under direct supervision of the FTIU Supervisor or a Firearm Examiner.
- Performs microscopic examinations for the identification and analysis of fired bullets, cartridge cases, other ammunition components, and other toolmarks under direct supervision.
- Performs chemical tests for the identification and analysis of gunpowder and lead residues, and shotgun pellet/pattern exams under direct supervision.
- Performs serial number restorations under direct supervision.
- Enters data and images into the National Integrated Ballistic Information Network (NIBIN), and analyzes correlated images for associations.
- Learns to compose technical laboratory reports describing the evidence examined, the results of examinations, and interpretation of results.
- Learns to testify in court as an expert witness and provide expert opinion testimony.
- May perform all stages of firearm and toolmark identification after completion of the training period.
- May perform the job description of a Forensic Scientist 2 upon completion of the training period.
- May gather physical evidence at crime scenes as a member of a Violent Crime Response Team (VCRT).
- Participates in Peer Review processes.
- Maintains technical and professional competence.
- Conducts troubleshooting and method development.
- Ensures compliance with safety rules and regulations.
- Conducts laboratory housekeeping.

2.1.5 Forensic Technician



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

- Processes physical evidence under the direct supervision of the FTIU Supervisor or a Firearm Examiner.
- Enters data and images into the National Integrated Ballistic Information Network (NIBIN).
- Performs general laboratory tasks when necessary.
- Performs documentation of NIBIN/IBIS-only casework.
- Ensures compliance with safety rules and regulations.

2.2 Qualifications

2.2.1 FTIU Supervisor/Technical Leader

Education: Must have graduated from an accredited college or university with a baccalaureate or advanced degree in chemistry, or other natural or physical science, including medical technology, forensic science, criminalistics, or other forensic related field, with a minimum of 24 semester hours or equivalent in chemistry.

Experience: Must have four (4) years of full-time professional forensic science work.

Continuing Education: Must stay abreast of developments within the field of firearm and toolmark identification by reading current scientific literature. Will attend and complete as many external training seminars and workshops pertaining to firearms identification as allowed.

2.2.2 Forensic Scientist 2 (Firearm Examiner)

Education: Must have graduated from an accredited college or university with a baccalaureate or advanced degree in chemistry, or other natural or physical science, including medical technology, forensic science, criminalistics, or other forensic related field, with a minimum of 24 semester hours or equivalent in chemistry.

Training: Must have, at a minimum:

- Training in the fundamentals of firearm and toolmark identification.
- Training in firearm and toolmark identification provided by individuals, agencies, or other laboratories in a program that includes the methods, procedures, equipment, and materials used in firearm and toolmark identification and their applications and limitations.

Experience: Prior to issuing reports on firearms casework, the examiner must have:

- Approximately two (2) years of firearm and toolmark identification experience (training) to include the successful analysis of a range of evidence typically encountered in forensic casework.
- A working knowledge of each stage of the analysis.
- Knowledge of the scientific principles, techniques, and literature on firearm and toolmark identification as demonstrated by course work and/or written and/or oral



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

examination. The examiner must also successfully complete a competency test and moot court peer evaluation.

- Practical laboratory skills in the performance of firearm and toolmark identification as demonstrated by observation and successful analytical results.
- Competency in firearm and toolmark identification as demonstrated by the successful completion of proficiency testing designed to evaluate technical and interpretational skills.

Continuing Education: Must stay abreast of developments within the field of firearm and toolmark identification by reading current scientific literature. Will attend and complete as many external training seminars and workshops pertaining to firearms identification as allowed.

2.2.3 Forensic Scientist 1 (Firearm Examiner in Training)

Education: Must have graduated from an accredited college or university with a baccalaureate or advanced degree in chemistry, or other natural or physical science, including medical technology, forensic science, criminalistics, or other forensic related field, with a minimum of 24 semester hours or equivalent in chemistry.

Training: Must gain during this time or already possess, at a minimum:

- Training in the fundamentals of firearm and toolmark identification.
- Training in firearm and toolmark identification provided by individuals, agencies, or other laboratories in a program that includes the methods, procedures, equipment, and materials used in firearm and toolmark identification and their applications and limitations.

Experience: The examiner must successfully complete and document a qualifying test (E.g., moot case and court testimony). The lab must document the qualification date. Also, the examiner must gain during this time:

- A minimum of two (2) years of firearm and toolmark identification experience to include the successful analysis of a range of evidence typically encountered in forensic casework.
- A working command of each stage of the analysis.
- Knowledge of the scientific principles, techniques, and literature on firearm and toolmark identification as demonstrated by course work and/or written and/or oral examination.
- Practical laboratory skills in the performance of firearm and toolmark identification as demonstrated by observation and successful analytical results.
- Competency in firearm and toolmark identification as demonstrated by the successful completion of competency testing designed to evaluate technical and interpretational skills.



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

Continuing Education: Must stay abreast of developments within the field of firearm and toolmark identification by reading current scientific literature. Will attend and complete as many external training seminars and workshops pertaining to firearm identification as allowed.

2.2.4 Forensic Technician

Education: Must have the equivalent of a diploma from a standard high school.

Experience: Must have, at a minimum:

- Two years of full-time experience in one or a combination of the following areas: (1) any professional laboratory work or, (2) non-professional laboratory work receiving and classifying evidence or; (3) any professional law enforcement work or, (4) non-professional law enforcement work receiving and classifying evidence.
- Course work credit received from an accredited college or university may substitute for the required experience on a month-for-month basis to a maximum of two years.

2.3 Training

2.3.1 The initial training period for a new Forensic Scientist in the FTIU is approximately two (2) years. Every examiner will be required to successfully complete the training program prior to performing independent casework analysis.

2.3.2 The initial training program for new Forensic Scientists in the FTIU will follow the guidelines set forth by the Association of Firearm and Tool Mark Examiners (AFTE), and supplemented with the National Institute of Justice (NIJ) Firearms Examiner Training modules. Examiners in training will be required to successfully complete:

- Training assignments and practical exercises, housed in the Forensic Services Division's document control software (ensur System) under FTIU Training Manual.
- An initial competency test covering the handling of evidence. This first competency test must be completed before the new Forensic Scientist handles actual casework evidence.
- A series of competency tests.
- Re-examination of old proficiency tests at the discretion of the training officer.
- Moot courts sessions.
- A final competency test that includes evidence processing, comparisons, report writing, and testimony in a mock trial.
- Tours of firearms manufacturers and ammunition manufacturers.
- Training for entering and correlating images in the NIBIN system.
- TBI Basic Crime Scene Processing School.
- External courses in serial number restoration, gunpowder and lead residue testing for distance determination, trajectory analysis, and crime scene processing are also recommended.



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

2.3.3 Each examiner in training will maintain a training notebook documenting his/her progress. The training officer and unit supervisor will periodically review the notebook and document the successful completion of training by placing their initials and date by each portion of training. The training officer or unit supervisor will issue a quarterly training memorandum documenting the progress of persons in training. These memorandums will be forwarded to the Quality Assurance Manager and Crime Laboratory Regional Supervisor.

2.3.4 Forensic Scientists and Technicians should stay abreast of developments within the field of Firearm and Toolmark Identification by reading current scientific literature and by attending seminars, professional meetings and other training sessions. Documentation of all training and continuing education will be maintained in each examiner's training notebook. Documentation of periodical reviews will be maintained in the FTIU.

2.3.5 If a deficiency is detected in an examiner's casework or annual proficiency test, that examiner may be subject to a remedial training period. The course of action shall be determined by the FTIU Technical Leader/Unit Supervisor, Quality Assurance Manager, and Crime Laboratory Regional Supervisor, and may include comparison exercises, casework performed under the direct supervision of another court qualified examiner, an adjusted caseload, or additional training. Depending on the severity of the deficiency, the examiner may be suspended from casework during the period of remedial training. Once the examiner has successfully completed remedial training requirements, he/she will be permitted to resume normal casework.

3.0 Equipment, Chemicals, Reagents, Reference Materials, and Supplies

The FTIU Technical Leader/Supervisor, or his/her designee, will approve all purchase requests for equipment, chemicals, and supplies used in the FTIU. Upon receipt of equipment, chemicals, or supplies, the packing slip or invoice will be reviewed to verify the items received match the order placed. This review will be documented on the packing slip or invoice.

3.1 Equipment

3.1.1 The FTIU Technical Leader/Supervisor will approve all requests for purchases of equipment and instruments.

3.1.2 Forensic Scientists or Technicians who utilize equipment in the FTIU will be knowledgeable in its use. Training will occur during the initial FTIU Forensic Scientist/Technician Training Program, or as needed. This training will include the manufacturer's instructions, procedures to be used, and any calibration and maintenance requirements.

3.1.3 All instruments will be validated or performance checked prior to being placed in service in the FTIU.

3.1.4 A comprehensive Maintenance and Calibration Notebook for all instruments will be maintained within the FTIU. This notebook will contain:

- The FTIU Equipment Inventory List;



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

- Operating manuals;
- Warranty information;
- Service Contact Information;
- Calibration Check Procedures and Schedule;
- Maintenance Procedures and Schedule;
- Maintenance and Calibration Check Logs;
- Supporting Documentation for external calibrations and maintenance;
- Service and Repair Logs; and
- Certificates of Calibration.

3.1.5 The Equipment Inventory List of all instruments in the FTIU will be maintained in the Maintenance and Calibration Notebook. This log will include the following information (when applicable): State Tag/ID number, type of instrument/equipment, manufacturer, model, serial number, Forensic Scientist/Technician assigned to the instrument/equipment, year purchased, operating status, and results of initial performance check.

3.1.6 Refer to the FTIU Standard Operating Procedures Manual, Appendix 7, for information on required performance checks on equipment in the FTIU.

3.2 Chemicals

3.2.1 Chemicals will be logged into the FTIU Chemical and Reagent Manual when they are received into the Unit. The date received, supplier, catalog number, lot number, expiration date, and whether a certificate of analysis was received will be recorded at this time. If the chemical poses a hazard, a warning sticker may be applied to the container if not already appropriately labeled. In addition, the container will be labeled with the date received and the initials of the examiner. If the manufacturer does not indicate that the chemical will expire, then a designation of "until consumed" or "N/A" will be used as an acceptable expiration date. When a chemical is initially opened, the examiner will record the date and their initials in the Chemical and Reagent Manual and on the container. Only one container of a chemical should be opened at a time.

3.2.2 When a chemical is consumed or expires, the date consumed/expired and examiner's initials will be recorded in the Chemical and Reagent Manual. Consumed or expired chemicals will be disposed of according to laboratory policy. At no time should expired chemicals be kept in the unit unless circumstances prevent disposal.

3.2.3 Chemicals will be stored in the appropriate cabinets and under the conditions specified by the manufacturer.

3.2.4 Material Safety Data Sheets will be maintained on all chemicals in the FTIU.

3.3 Reagents

3.3.1 Reagents should be prepared in accordance with the procedures outlined in the FTIU Standard Operating Procedures or FTIU Chemical and Reagent Manual. Any deviation from the described methods must be indicated in the case notes and justified. The Reagent Log forms



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

will be filled out for each reagent made. The Reagent Log forms will include the reagent name, preparation date, expiration date, appropriate lot numbers, initials of the examiner that prepared the reagent, and results of testing to ensure the reagent is performing correctly. A reagent sticker will be placed on the container with the reagent name, date prepared, expiration date, and examiner's initials. An exception will be made for reagents that expire the day they are made. These reagents will be labeled with the name of the reagent and should be discarded after use. Other information will be recorded on the Reagent Log forms.

3.3.2 All reagents will be tested when prepared to ensure proper functioning. The results will be documented on the Reagent Log forms. If testing indicates that the reagent is not functioning properly, the reagent will be discarded and made again.

3.3.3 Reagents will be tested prior to use on evidence. Reagents that require a positive and negative control test prior to testing on evidence will have those results recorded in the case notes.

3.3.4 All reagents will be stored under appropriate conditions as outlined in the FTIU Chemical and Reagent Manual.

3.4 Reference Materials

3.4.1 Certified reference standards in use within the FTIU consist of weight standards and gauge blocks. These certified reference standards will be stored according to manufacturers' information, will be uniquely identified and appropriately labeled, and will have a period of validity.

3.4.2 Certified reference materials in use within the FTIU consist of steel rulers, Hot Rods, tape measurers, and trigger pull weights. These items will be stored according to manufacturers' information, will be uniquely identified and appropriately labeled, and will have a period of validity.

3.4.3 The Ammunition Reference Collection (ARC) consists of cartridges and cartridge components. The reference materials in the ARC shall be documented, uniquely identified, and properly controlled.

3.4.4 The Test Fire Reference Collection consists of fired bullets and cartridge cases from all firearms submitted in conjunction with a criminal matter and test fired by the TBI FTIU. These samples will be maintained in a designated area that is secure and has limited access. Any addition to the Test Fire Reference Collection will be properly sealed, uniquely identified with barcode attached, and electronically scanned to the Test Fire Storage where they will be retained indefinitely. An electronic inventory of the Test Fire Reference Collection will be maintained in the LIMS system.

Note: Test toolmarks and toolmark casts will be maintained in the Test Fire Reference Collection and will follow the same guidelines described above.



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

3.4.5 The Test Pattern Reference Collection consists of test patterns created in conjunction with criminal matters and produced by the TBI FTIU. These samples will be maintained in a designated area that is secure and has limited access. Any addition to the Test Pattern Reference Collection will be properly sealed, uniquely identified with barcode attached, and electronically scanned to the Test Pattern Storage where they will be retained indefinitely. An electronic inventory of the Test Pattern Reference Collection will be maintained in the LIMS system.

4.0 Validation

4.1 All new methodology will be validated prior to use on evidentiary items. The FTIU Technical Leader or his/her designee will formulate a planned activity to test the reliability of the new methodology. The Quality Assurance Manager will approve the planned validation study before it is implemented. Once the validation study has been completed, the results are provided to the Technical Leader, Quality Assurance Manager, and Crime Laboratory Regional Supervisor for review and final approval.

4.2 Upon successful completion of a competency test, each Forensic Scientist/Technician will be authorized to use the new procedure in casework analyses.

4.3 All validation procedures, reports, results of competency testing, and supporting documentation will be retained in the FTIU indefinitely.

5.0 Proficiency Testing (PT)

Forensic Scientists assigned to the FTIU will successfully complete one proficiency test per discipline each calendar year. These disciplines include firearm examinations and toolmark examinations. Forensic Scientists will also complete proficiency tests in each category of testing once per accreditation cycle, at a minimum. These categories of testing include NIBIN, serial number restoration, and distance determination. The FTIU Technical Leader and Quality Assurance Manager will review the results.

5.1 Review of Proficiency Test Results

5.1.1 Firearm Analysis Proficiency Tests (Bullets and/or Cartridge Cases)

The PT results for bullet and/or cartridge case comparisons will be evaluated based on the wording of the results on the report in LIMS and submitted to the PT provider. These results will be verified by documentation of the comparisons performed. There may be differences in the conclusions (check boxes) submitted to the PT provider for identifications, eliminations, and/or inconclusive results. These differences might be based on the experience of the examiner, the sample set, and/or reproducibility of the individual characteristics present on the items examined. Differences in the check boxes do not indicate an incorrect response and require further evaluation. The Quality Assurance Manager and Technical Leader or his/her representative will evaluate these conclusions for correctness.

5.1.2 Toolmark Proficiency Tests



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

The PT results for toolmark comparisons will be evaluated based on the wording of the results on the report in LIMS and submitted to the PT provider. These results will be verified by documentation of the comparisons performed. There may be differences in the conclusions (check boxes) submitted to the PT provider for identifications, eliminations, and/or inconclusive results. These differences might be based on the experience of the examiner, the sample set, and/or reproducibility of the individual characteristics present on the items examined. Differences in the check boxes do not indicate an incorrect response and require further evaluation. The Quality Assurance Manager and Technical Leader or his/her representative will evaluate these conclusions for correctness.

5.1.3 Serial Number Restoration Proficiency Tests

The PT results of serial number restorations will be considered correct if all characters recovered are correctly identified. If any character is unable to be restored, it should be indicated with an "*" or "?", and followed with an explanation. This could occur due to an inconclusive character or a character unable to be restored. Unrecovered characters do not indicate an incorrect result.

5.1.4 Distance Determination Proficiency Tests

The PT results of distance determination testing will be considered correct if the actual distance indicated by the PT provider on their results sheet is within the bracket of distances reported by the forensic scientist.

5.1.5 NIBIN Proficiency Tests

The NIBIN PT results will be considered correct if the image is entered correctly, Regions of Interest (ROIs) are appropriately marked, and the Matchpoint system matches it to other samples from the same source in the top 20 candidates by rank sort. Note: The FTIU Technical Leader or his/her representative should enter his/her sample first for others to search against, then manually correlate at a later date to confirm his/her PT is correctly entered.

6.0 Documentation

The FTIU must maintain documentation on all significant aspects of the firearm and toolmark identification procedures as well as any related documents or laboratory records that are pertinent to the analysis or interpretation of results. This documentation will serve as a traceable audit trail as well as an archive for retrospective scientific inspection, re-evaluation of the data, and reconstruction of the firearm and toolmark procedure. Documentation will exist for the following topic areas:

6.1 Test Methods and Procedures for Firearm and Toolmark Identification

This documentation must describe in detail the procedure currently used for the analytical testing of firearm and toolmark evidence in the FTIU. It must include the date the procedure was adopted and approved for use. Revisions must be clearly documented and appropriately



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

approved. This information will be found in the FTIU Standard Operating Procedures Manual housed in the Forensic Services Division's document control software (ensur System).

6.2 Quality Control of Reagents

All instruction documentation is recorded in the FTIU Chemical and Reagent Manual housed in the Forensic Services Division's document control software (ensur System). Current, in-use, log sheets and records will be maintained in a notebook located in the FTIU. Archived copies of log sheets and procedures will be retained indefinitely.

6.3 Case Files/Case Notes/Case Records

There must be policies and quality assurance procedures in place to ensure the reliability and completeness of the documentation, data analysis, reports, and review processes of all cases examined by the FTIU.

6.3.1 Casework Documentation

Casework Documentation must provide a foundation for the results and conclusions contained in the Official Firearms Report.

- Documentation must be in such a form that a competent examiner or supervisor/technical leader, in the absence of the primary examiner, would be able to evaluate and interpret the data analysis.
- Documentation must include, but is not limited to, data obtained through the analytical process. It should also include information regarding the packaging of evidence upon receipt and the condition of the evidence itself.
- Documentation must include a start and stop date. The start date will be the date documentation and examination begins. The stop date will be the date the case is completed and turned over for technical review. The verification may be completed after the stop date. This information will be recorded on the case progress sheet, and the case will be draft completed electronically in the LIMS system. Any changes made after the stop date will be recorded in the case record.
- All documentation of procedures, observations made, and results of tests performed which are used to support the examiner's conclusions must be preserved as a record according to laboratory policy. Results will be preserved by notes, photography, computer drives, or other suitable means.

6.3.2 Interpretation of Data

The FTIU shall have general guidelines for interpretation of data for each method utilized in the examination of firearm and toolmark evidence. These guidelines are found in the FTIU Standard



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

Operating Procedures Manual housed in the Forensic Services Division's document control software (ensur System).

6.3.3 Review of Casework

Casework Review includes verification of evidence, Technical Review of the case record, and Administrative Review of the case record. Specific information regarding these reviews is found in Appendix 8 of the Standard Operating Procedures Manual housed in the Forensic Services Division's document control software (ensur System).

6.3.3.1 Technical Review

Data, documentation, calculations, and conclusions must be reviewed independently by a second qualified examiner. Technical Reviews may be performed by all examiners performing casework. Prior to issuing a report, both examiners must agree on the interpretation of the data and the conclusions derived from that data. Refer to the Forensic Services Division QAM and FTIU Standard Operating Procedures Manual Appendix 8.

If a discrepancy, or difference of opinion, occurs during the Technical Review resulting in an examiner changing his or her original report, this discrepancy and outcome will be recorded on the Case Progress worksheet or in the LIMS system. If the discrepancy is clerical in nature, that may also be noted in this location.

It is the responsibility of the FTIU Supervisor/Technical Leader or his or her designee to assure that all deficiencies are acknowledged and that any corrective action is successfully completed. In the event of an unresolvable disagreement between the technical reviewer and the examiner, the casework is to be referred to the FTIU Supervisor/Regional Laboratory Director and/or the FTIU Technical Leader. In the event the disagreement is still unresolved, the matter must be referred to the Assistant Director who may confer with the Quality Assurance Manager.

6.3.3.2 Administrative Review

The report and case notes must be reviewed for grammatical and spelling errors, proper page numbering, an accurate Chain of Custody, and that all administrative information is correct. The FTIU Supervisor or his or her designee will serve as the Administrative Reviewer.

6.3.4 Chain of Custody

The official Chain of Custody will be maintained in the Laboratory Information Management System (LIMS). Additional information may be found in the QAM and in the FTIU Standard Operating Procedures Manual, Section 3.

6.4 Proficiency Testing

Results of Proficiency Tests will be stored in the Laboratory's document control software (ensur System) for a minimum of one accreditation cycle. Results of Proficiency Tests may also be



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

maintained in the LIMS system. Supporting documentation may also be maintained in the examiner's training notebook.

6.5 Method Validation Records

Method Validation Records will be maintained in the FTIU indefinitely.

6.6 Historical and/or Archival Records

Archived Policies and Procedures specific to the FTIU will be maintained in the FTIU or in the ensur System indefinitely.

7.0 Professional Development

7.1 It is recommended that the employees of the FTIU participate in any continual training provided by the Tennessee Bureau of Investigation.

7.2 Upon returning from a training program or conference, any certificate will be uploaded into the ensur System.

7.3 Each employee must maintain a training record, which should contain the following:

- A current copy of their Curriculum Vitae.
- A copy of their degree, or an official transcript.
- A current copy of their Authorization memo.
- A current copy of their training record.
- Certificates and training forms from such events as professional meetings, seminars, technical training, in-laboratory training and meetings, college courses, and conferences.
- Certificates and letters of appreciation/commendation.
- Record of court testimonies and/or copies of the *Court Testimony Evaluation* forms.
- Copies of Proficiency Test Results.

This record will be maintained in the Laboratory's document control software (ensur System) and may be kept in a training notebook.

8.0 Safety

8.1 Refer to the TBI Safety Manual and QAM for general safety requirements and hazard information.

8.2 Personal Protective Equipment shall be used when working with clothing and/or bloodstained or biohazardous items. Contaminated bullets and other ammunition components should be decontaminated with bleach prior to comparative examinations.

8.3 Hazardous chemicals must be used in a chemical fume hood.



TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Firearms/Toolmarks Standard Operating Procedures Manual

Quality Assurance Procedures

8.4 When diluting acids, always add acid to water.

8.5 When necessary, consult Material Safety Data Sheets (MSDS) regarding any chemical used in the FTIU. The MSDS for chemicals used in the FTIU are maintained in the unit. A laboratory wide compilation of MSDS is also available.

8.6 Any personnel handling a firearm to be examined and/or repaired should follow general firearms safety guidelines:

- All firearms should be treated as if they are loaded.
- The laser rule should be followed. Never point a firearm at anything you are not willing to destroy.
- Be certain of your target and what is beyond it.
- Keep your finger off the trigger until you are ready to fire.

8.7 Any personnel utilizing the water tank or firing range should also comply with the following safety procedures:

- Personal protective equipment, such as eye and ear protection, must be worn during firing.
- At least one other person, a "spotter", must be present.
- The "Firing Range in Use" light is to be turned on.
- When firing indoors, either into the water tank or down range, the exhaust fan should be turned on.
- When firing into the Bullet Recovery Tank, only one round of ammunition will be loaded into the magazine at a time.

8.8 Each employee assigned to the FTIU should have their blood tested annually for Blood Lead Levels. Because lead contamination is an inherent risk associated with excessive use and handling of firearms, the following safety measures are in place to reduce this exposure:

- Firing Range and Bullet Recovery Tank are ventilated to remove airborne lead resulting from firing of firearms.
- A sticky mat is located at the exit of the Test Firing Area to remove any lead from shoes, preventing lead from being tracked into the Laboratory Examination Area.
- Periodic wet mopping is performed in the Test Firing Area and Laboratory Examination Area to remove excess lead from the floor.